

**FIGURE 1 - PRIOR  
ART PROPANE  
RECOVERY**

**TABLE 1 - STREAM SUMMARY FOR FIGURE 1 PROPANE RECOVERY- PRIOR ART**

Stream Number	1	2	3	4	5	6	7	8
Temp., °F	68	67	-22	-22	-22	-100	-101	-100
Pressure, psig	1300	1275	1268	1268	1268	449	447	470
Flow, lbmol/hr	109,805	109,805	109,805	109,805	109,805	20,796	20,796	20,796
Stream Number	9	10	11	12	13	14	17	18
Temp., °F	-102	57	-25	203	-20	-75	-75	-75
Pressure, psig	445	463	440	453	450	445	470	445
Flow, lbmol/hr	105,703	20,796	105,703	4,100	33,395	33,395	16,700	21,800
Stream Number	19	20	21	22	23			
Temp., °F	-75	24	73	201	110			
Pressure, psig	445	433	600	1315	1300			
Flow, lbmol/hr	11,595	105,703	105,703	105,703	105,703			
<b>Key Stream Component Flow (lbmol/hr)</b>								
Stream Number	1	7	9	12	13	16	17	23
CO2	1,647	608	1,647	0	1,446			
N2	471	15	471	0	19			
C1	97,044	11,907	97,043	0	19,095			
C2	6,582	4,217	6,528	54	12,831			
C3	2,988	2,976	13	2,975	5			
IC4	327	327	0	327	0			
NC4	488	488	0	488	0			
IC5	125	125	0	125	0			
NC5	124	124	0	124	0			
NC6	9	9	0	9	0			
Recoveries:								
Propane								
Butanes+								
Residue Gas Compressor								
	<b>99.5%</b>							
	<b>100.0%</b>							
	<b>43,000 HP</b>							
	<b>43.00 HP/MMscfd</b>							

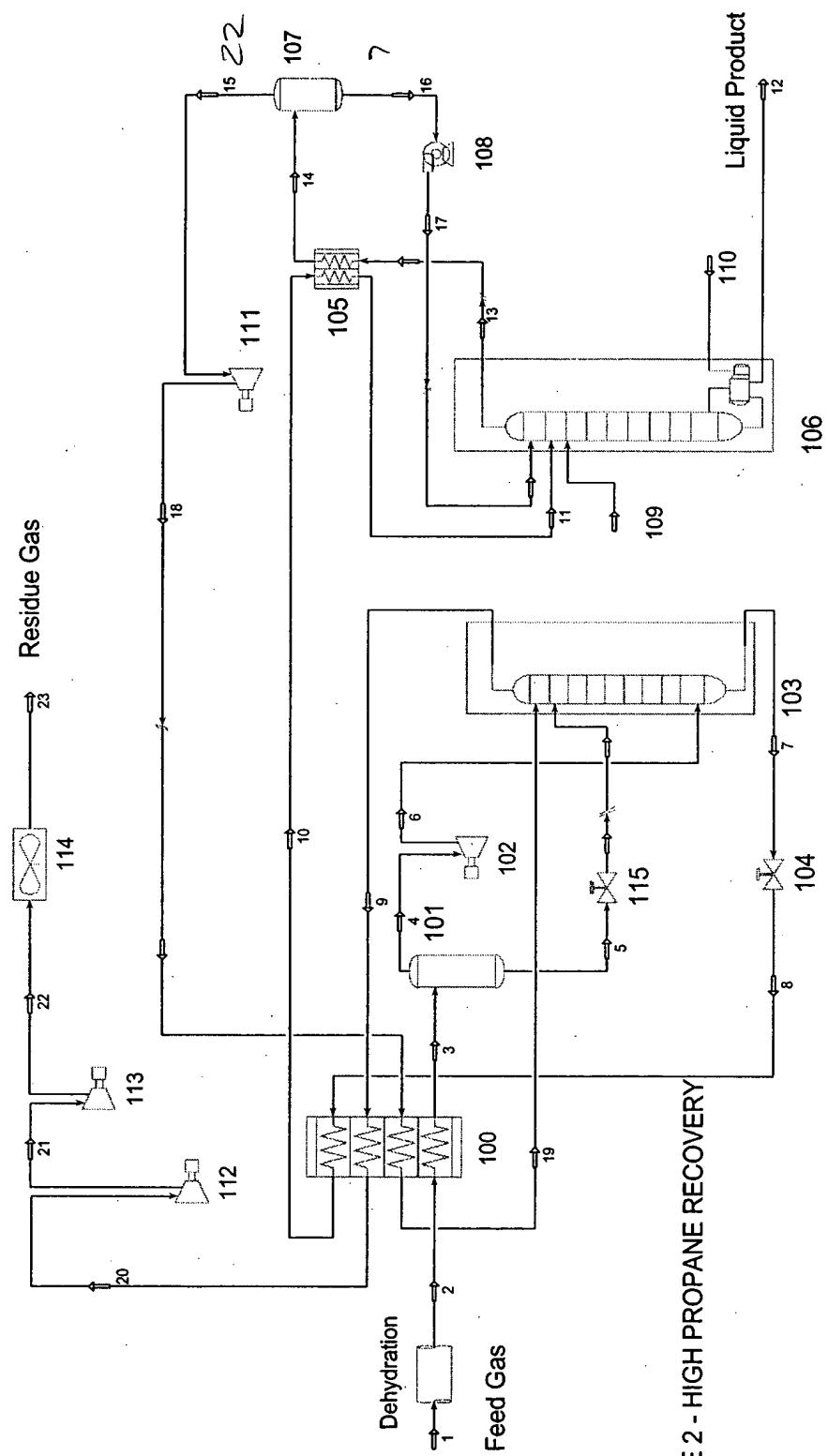


FIGURE 2 - HIGH PROPANE RECOVERY

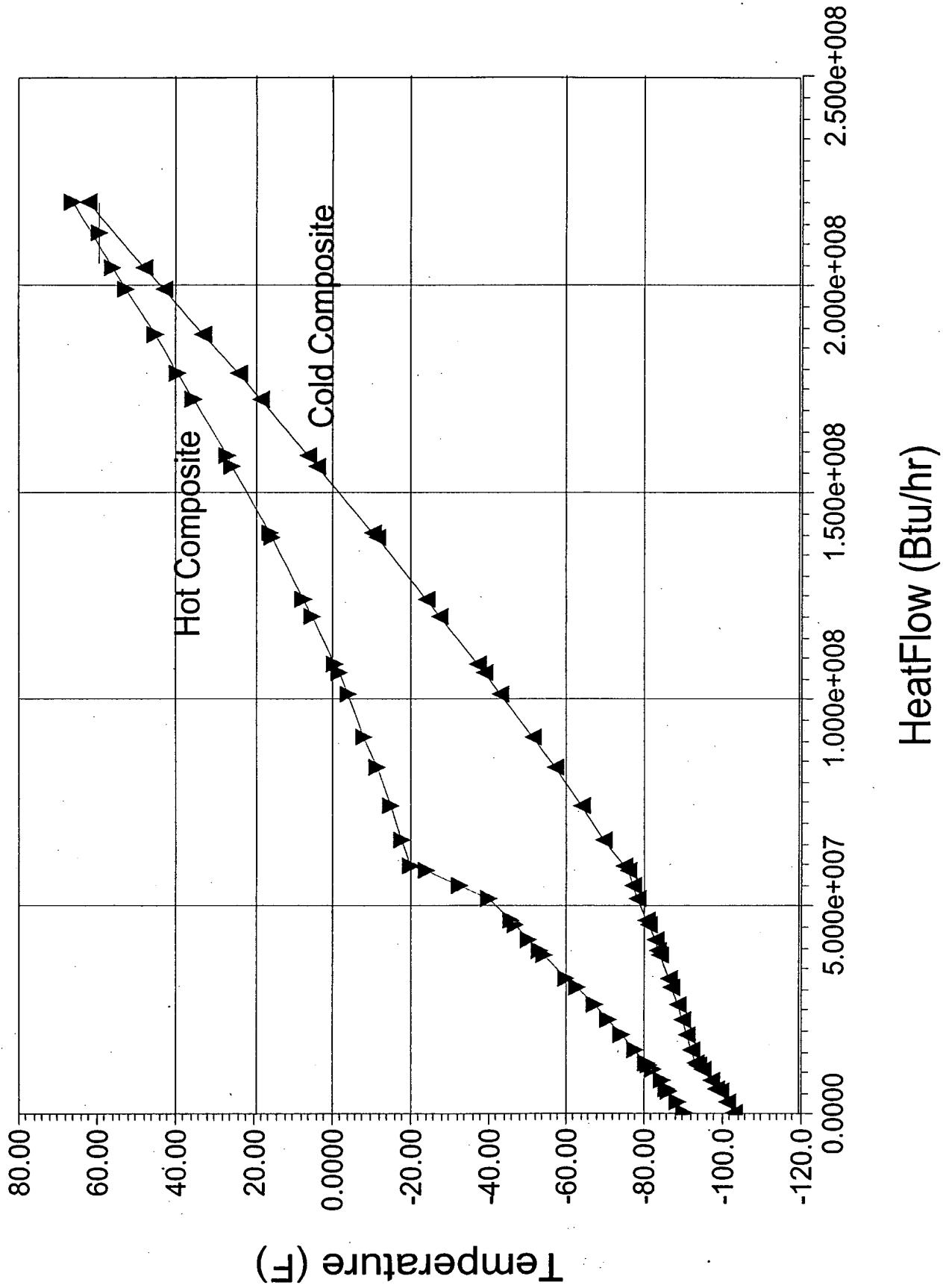
**TABLE 2 - STREAM SUMMARY FOR FIGURE 2 - PROPANE RECOVERY**

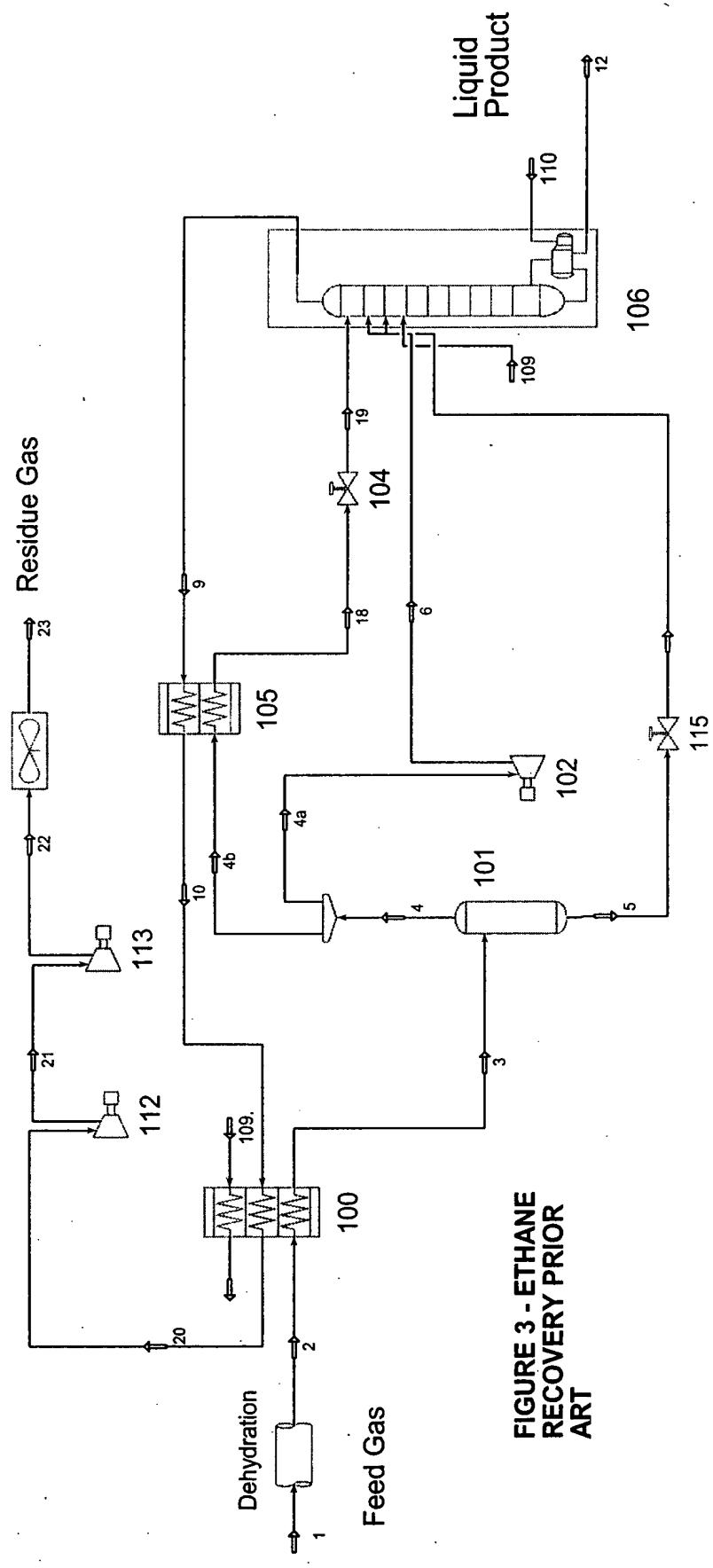
Stream Number	1	2	3	4	5	6	7	8	9
Temp., °F	68	67	-20	-20	-20	-81	-85	-103	-93
Pressure, psig	1300	1275	1268	1268	1268	589	587	420	585
Flow, lbmol/hr	109,805	109,805	109,805	109,805	0	109,805	25,953	25,953	105,703
Stream Number	10	11	12	13	14	15	16	17	18
Temp., °F	-77	-37	191	-33	-54	-54	-54	-53	-1
Pressure, psig	413	408	403	400	395	395	395	485	600
Flow, lbmol/hr	25,953	25,953	4,111	28,664	28,673	21,851	6,822	6,822	21,851
Stream Number	19	20	21	22	23				
Temp., °F	-90	62	98	197	110				
Pressure, psig	593	575	724	1315	1300				
Flow, lbmol/hr	21,851	105,703	105,703	105,703	105,703				

**Key Stream Component Flow (lbmol/hr)**

Stream Number	1	7	9	12	13	16	17	23
CO2	1,647	701	1,647	0	955	254	254	1,647
N2	471	26	471	0	27	1	1	471
C1	97,044	16,057	97,048	0	18,029	1,972	1,972	97,048
C2	6,582	5,104	6,533	54	9,614	4,563	4,563	6,533
C3	2,988	2,993	4	2,985	40	32	32	4
IC4	327	327	0	327	0	0	0	0
NC4	488	488	0	488	0	0	0	0
IC5	125	125	0	125	0	0	0	0
NC5	124	124	0	124	0	0	0	0
NC6	9	9	0	9	0	0	0	0
Recoveries:								
Propane								
Butanes+								
Residue Gas Compressor								
DeC2 Ovhd Compressor								
Total HP								
33,320	HP							
2,890								
36,210								
36.21	HP/MMscfd							

Figure 2A - High Propane Recovery Composite Curve





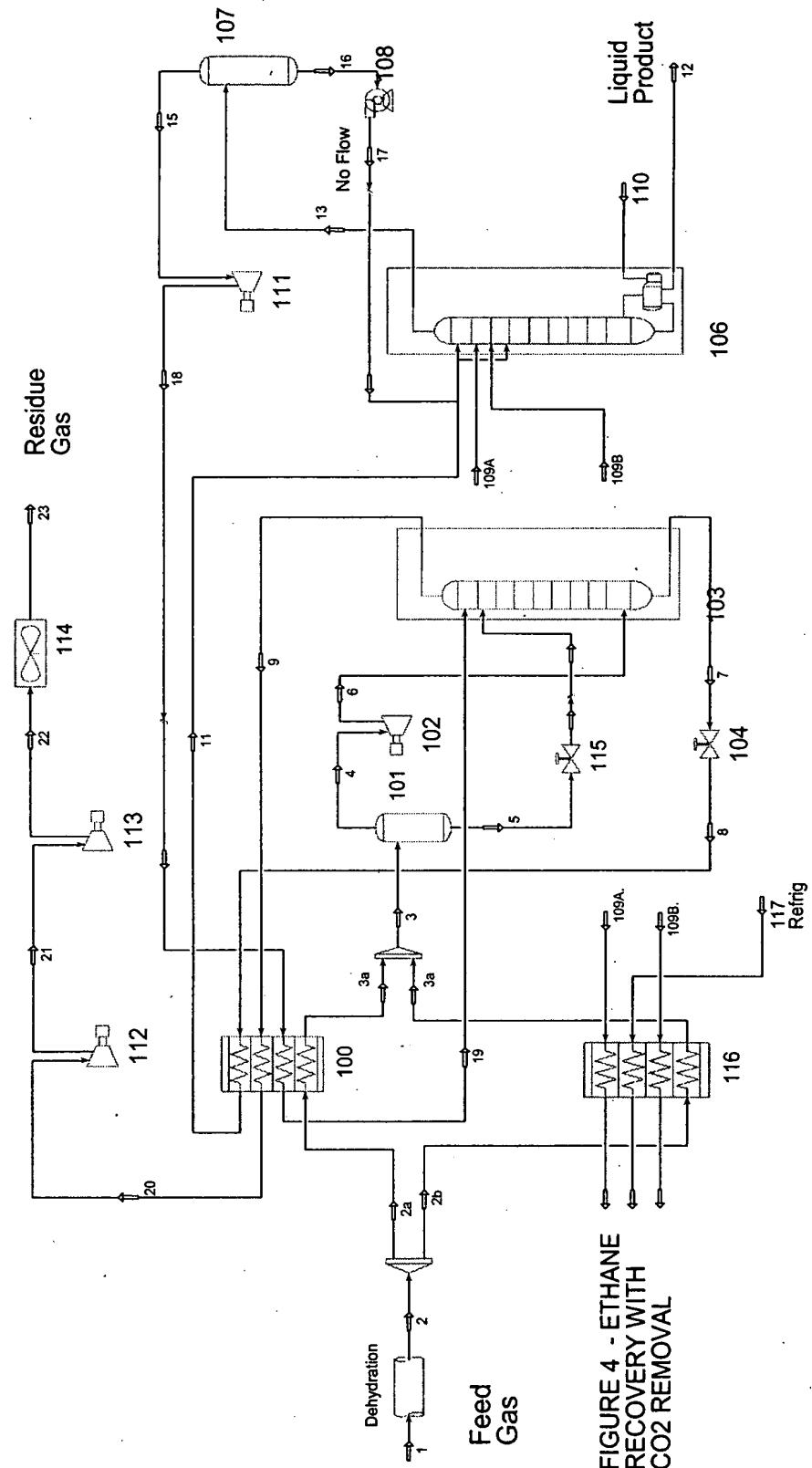
**FIGURE 3 - ETHANE  
RECOVERY PRIOR  
ART**

**TABLE 3 - STREAM SUMMARY FOR FIGURE 3 ETHANE RECOVERY-PRIOR ART**

Stream Number	1	2	3	4	4a	4b	5	6
Temp., °F	68	67	35	35	35	35	35	-62
Pressure, psig	1300	1275	1268	1268	1268	1268	1268	429
Flow, lbmol/hr	109,805	109,805	109,805	109,805	64,236	45,569	-	64,236
Stream Number	9	10	12	16	18	19	20	21
Temp., °F	-125	18	97	55	-121	-132	31	76
Pressure, psig	425	420	428	427	1263	429	415	558
Flow, lbmol/hr	100,496	100,496	9,309	22,201	45,569	45,569	100,496	100,496
Stream Number	22	23	109					
Temp., °F	220	110	32					
Pressure, psig	1315	1300	427					
Flow, lbmol/hr	100,496	100,496	22,201					

**Key Stream Component Flow (lbmol/hr)**

Stream Number	1	9	12	23
CO2	1,647	1,542	105	1,542
N2	471	471	0	471
C1	97,044	97,043	1	97,043
C2	6,582	1,347	5,236	1,347
C3	2,988	87	2,901	87
IC4	327	3	324	3
NC4	488	3	485	3
IC5	125	0	124	0
NC5	124	0	124	0
NC6	9	0	9	0
<b>Recoveries:</b>				
Ethane	79.5%			
Propane	97.1%			
Butanes+	99.4%			
Residue Gas Compressor	46,230	HP	46,23	HP/MMscfd
CO2 in C2	2.0%			



**FIGURE 4 - ETHANE RECOVERY WITH CO<sub>2</sub> REMOVAL**

**TABLE 4 - STREAM SUMMARY FOR FIGURE 4 ETHANE RECOVERY**

Stream Number	1	2	3	4	5	6	7	8
Temp., °F	68	67	-50	-50	-50	-101	-104	-116
Pressure, psig	1300	1275	1268	1268	1268	589	587	475
Flow, lbmol/hr	109,805	109,805	109,805	109,805	109,805	66,995	66,995	58,416
Stream Number	9	11	12	13	15	16	17	18
Temp., °F	-111	-108	110	-90	-90	-90	-81	-56
Pressure, psig	585	472	450	448	448	448	485	595
Flow, lbmol/hr	101,195	66,995	8,580	58,416	58,416	-	-	-
Stream Number	19	20	21	22	23	109A.	109B.	117
Temp., °F	-111	62	87	198	110	-27	-89	6
Pressure, psig	588	575	675	1315	1300	449	458	28
Flow, lbmol/hr	58,386	101,195	101,195	101,195	21,550	33,597	4,105	-

**Key Stream Component Flow (lbmol/hr)**

Stream Number	1	7	9	11	12	13	17	23
CO2	1,647	1,723	1,644	1,723	2	1,720	-	1,644
N2	471	117	471	117	0	117	-	471
C1	97,044	53,038	97,016	53,038	0	53,038	-	97,016
C2	6,582	7,870	2,013	7,870	4,568	3,302	-	2,013
C3	2,988	3,162	50	3,162	2,938	224	-	50
IC4	327	334	1	334	326	7	-	1
NC4	488	494	1	494	487	7	-	1
IC5	125	125	0	125	125	1	-	0
NC5	124	124	0	124	124	0	-	0
NC6	9	9	0	9	9	0	-	0
Recoveries:								
Ethane	69.4%							
Propane	98.3%							
Butanes+	99.9%							
Residue Gas Compressor	35,592	HP						
DeC2 Ovhd Compressor	4,489							
Refrigeration	4,728							
Total HP	44,809							
CO2 in Ethane	500	ppm						
	44.81	HP/MMscfd						

Figure 4A - Ethane Recovery Composite Curve for Feed Exchanger 100

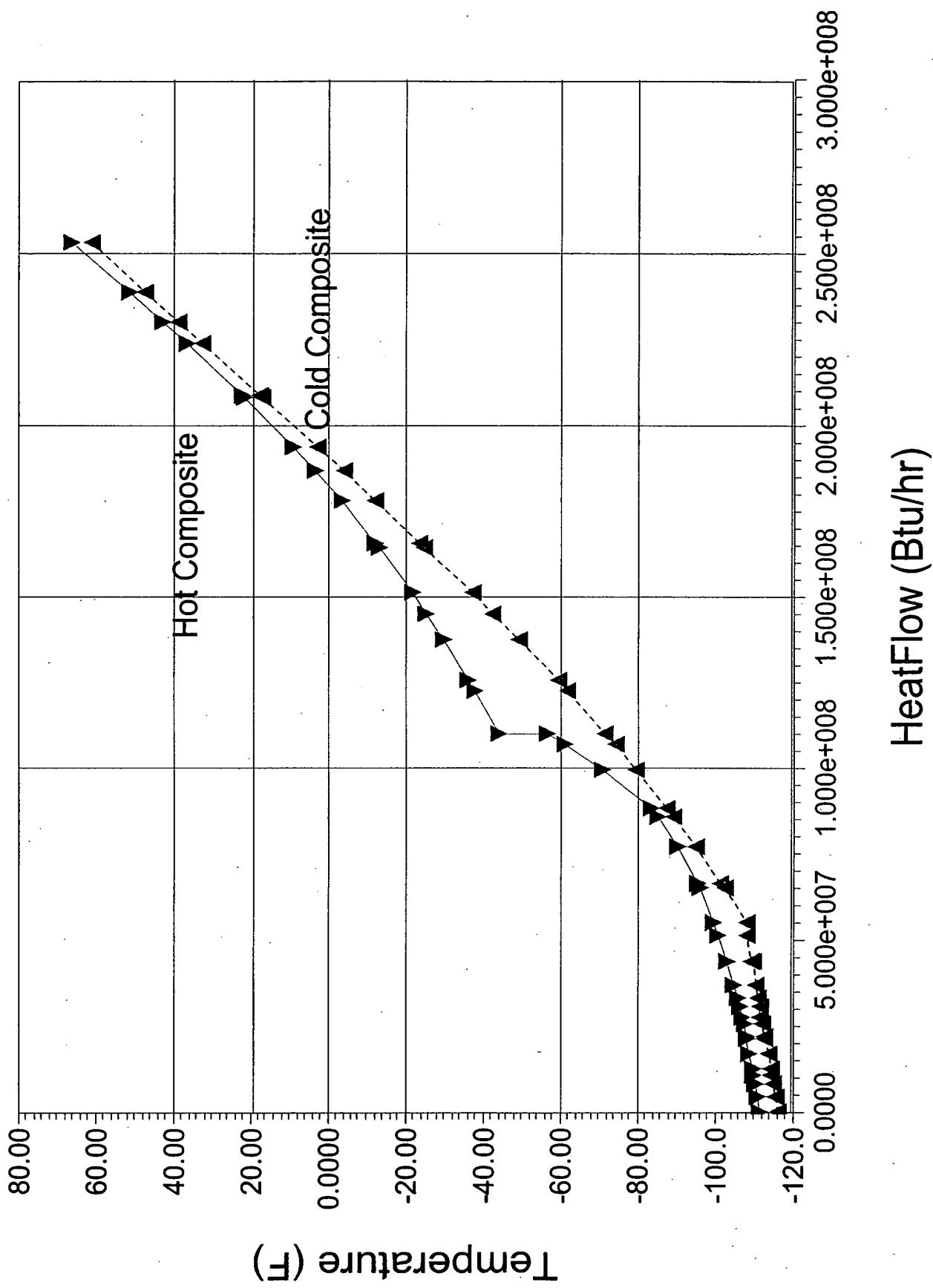
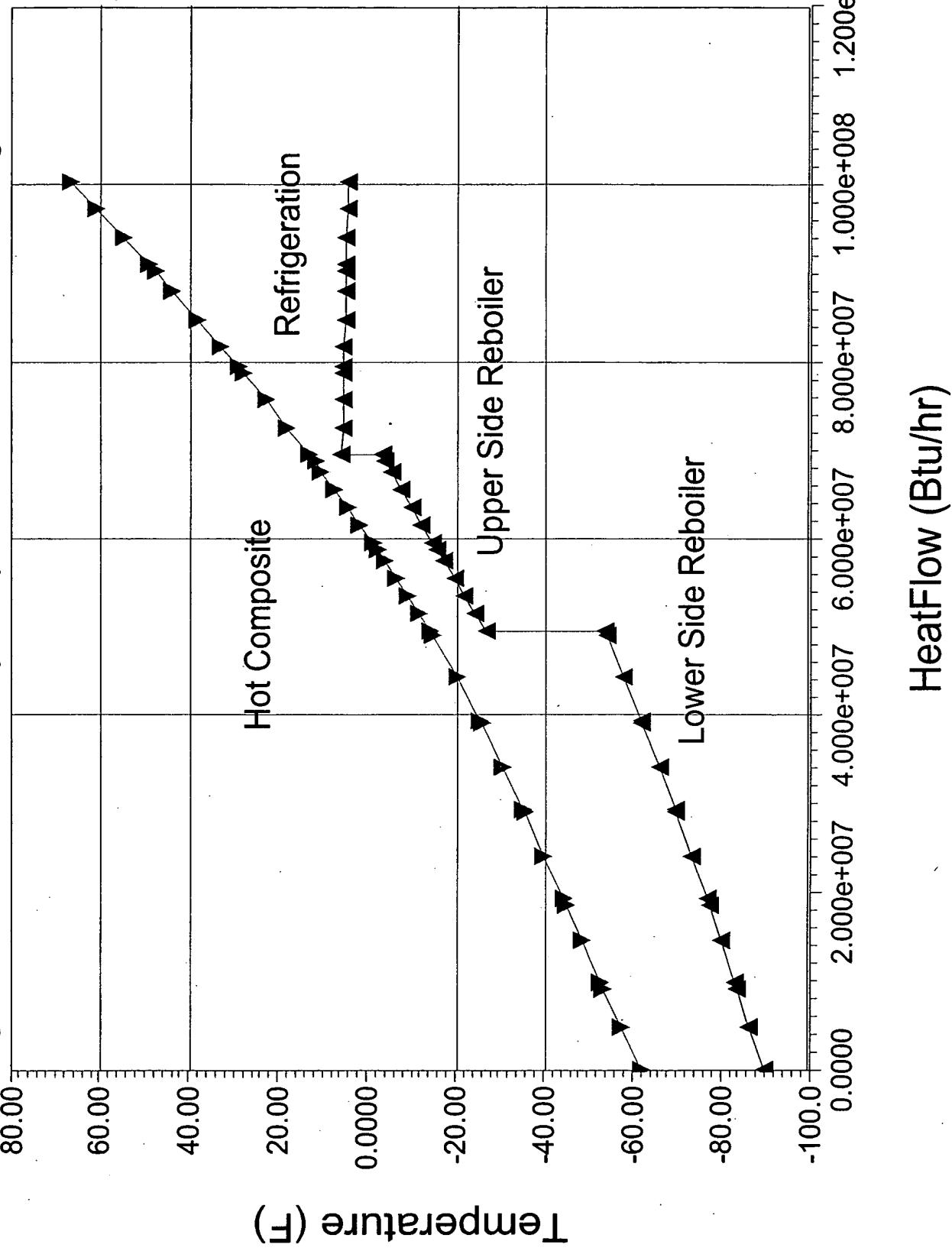
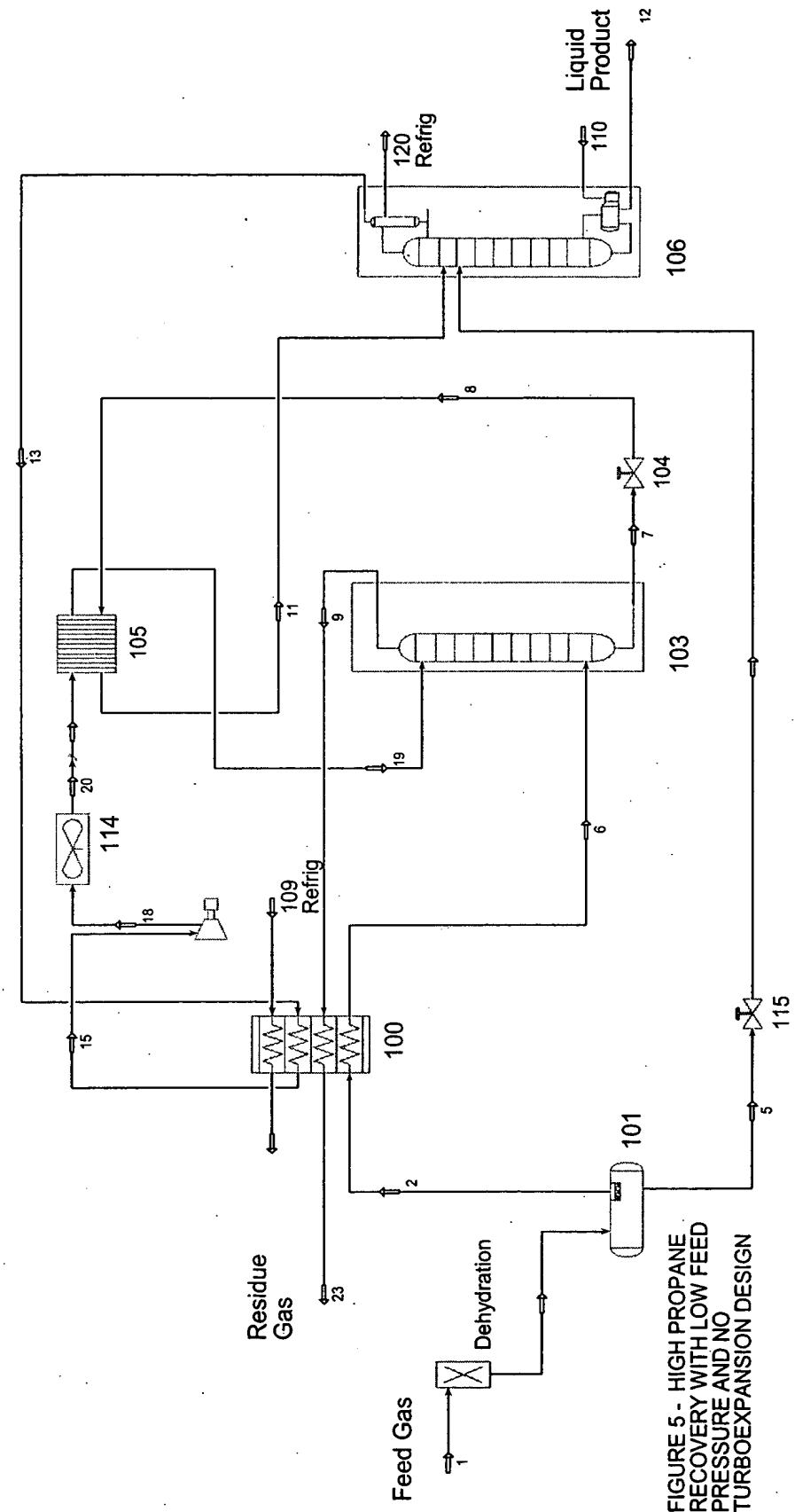


Figure 4B - Ethane Recovery Composite Curve for Side Exchanger 116





**Table 5 - STREAM SUMMARY FOR FIGURE 5**

**HIGH PROPANE RECOVERY WITH LOW FEED PRESSURE AND NO TURBOEXPANSION**

Stream Number	1	2	5	6	7	8	9	11
Temp., °F	125	125	125	-45	47	-61	-58	10
Pressure, psig	765	750	750	743	725	515	720	510
Flow, lbmol/hr	109,805	107,684	1,517	107,684	53,394	53,394	91,164	53,394

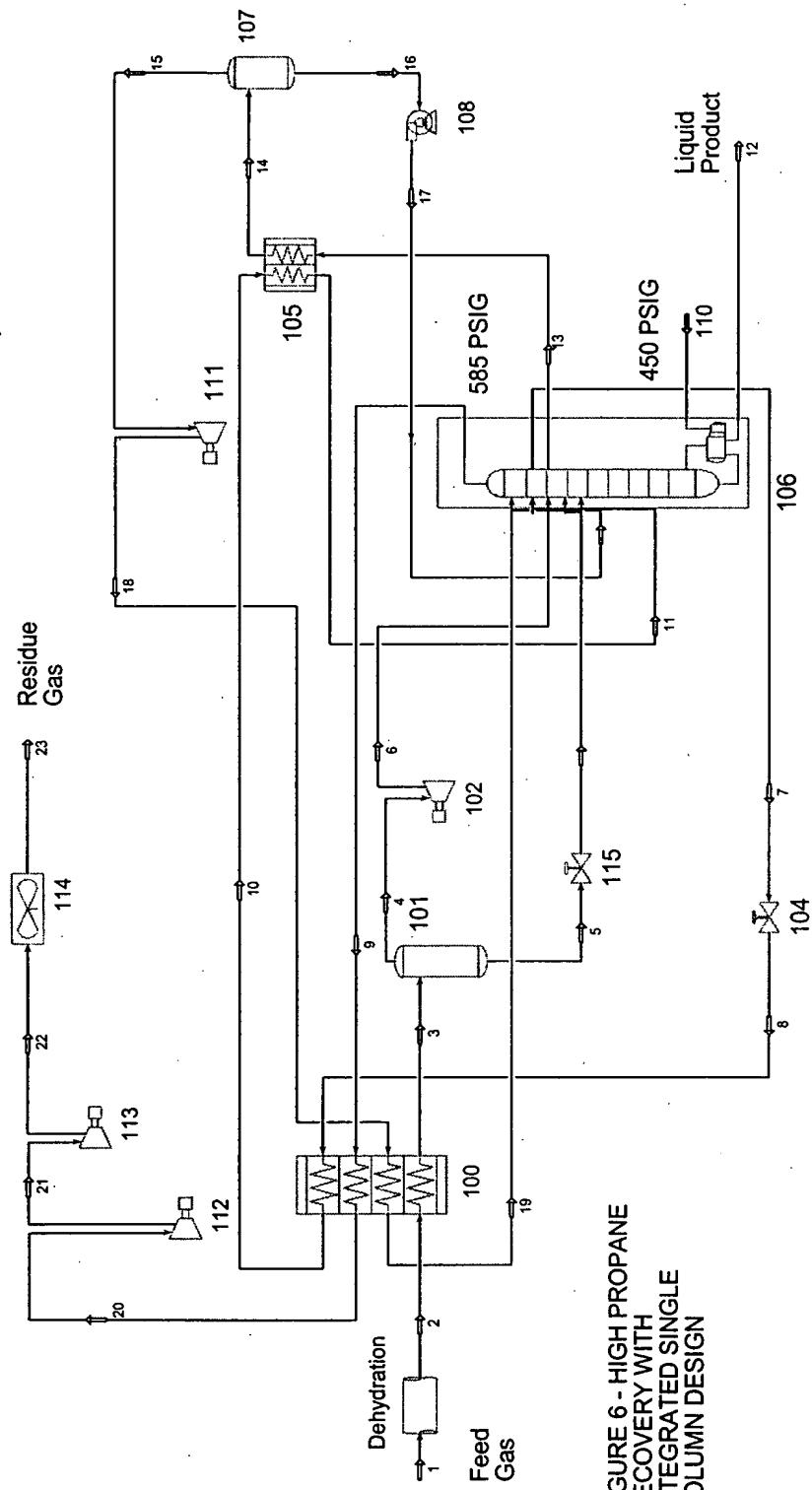
Stream Number	12	13	15	18	19	20	23
Temp., °F	239	-30	95	168	-50	100	100
Pressure, psig	506	500	493	780	770	775	713
Flow, lbmol/hr	17,686	37,224	37,224	37,224	36,874	37,224	91,164

**Key Stream Component Flow (lbmol/hr)**

Stream Number	1	2	5	7	9	12	13	23
CO2	1,647	1,648	1,649	1,650	1,651	1,652	1,653	1,654
N2	3,814	3,808	6	520	3,809	0	526	3,809
C1	70,549	70,297	252	23,535	70,338	0	23,787	70,338
C2	10,767	10,645	121	8,598	10,529	144	8,575	10,529
C3	10,284	10,017	267	10,233	282	10,000	500	282
IC4	2,002	1,908	94	1,908	0	2,002	0	0
NC4	2,813	2,648	164	2,648	0	2,813	0	0
IC5	829	744	85	744	0	829	0	0
NC5	656	576	79	576	0	656	0	0
NC6+	1,242	834	408	834	0	1,242	0	0

**Recoveries:**  
**Propane**  
**Butanes+**

97.2%  
100.0%



**FIGURE 6 - HIGH PROPANE RECOVERY WITH INTEGRATED SINGLE COLUMN DESIGN**